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RISK ANALYSIS IN ARMS CONTROL INSPECTION WARNINGS

by

Ivan Taylor

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ABSTRACT

With the new Chemical Weapons Inspection Protocol, a participating nation can request an on-site inspection of a facility in another country with only 12 hours notice. Therefore it is extremely important that the message traffic from the Department of Foreign Affairs and International Trade and the Department of National Defence be efficient enough to allow the Canadian Forces Base the maximum time to prepare. A Staff Officer in the J3 Arms Control Verification (J3 ACV) organization developed a timeline estimate of the message processing. The author, a member of the Joint Staff Operational Research Team, ran the @RISK analysis tool to determine the probability that a message will be processed by National Defence Headquarters and passed to the Base in one hour. Four potential processing paths were identified by J3 ACV. The normal processing path in Silent Hours was particularly risky. However, a Streamlined path appeared to provide a high reliability that the message would be processed in one hour.

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RISK ANALYSIS IN ARMS CONTROL INSPECTION WARNINGS

INTRODUCTION

1. With the new Chemical Weapons Inspection Protocol to be put in place on 1 April 1997, a participating nation can request an on-site inspection of a facility in another country with only 12 hours notice. Therefore, it is extremely important to ensure timely message traffic of the warning prior to the inspection. The Department of Foreign Affairs and International Trade (DFAIT) has guaranteed that international messages will be processed and transmitted by them to the Department of National Defence in one hour. The Staff Officer in J3 Arms Control Verification (J3 ACV) would like to ensure that the message is passed to the appropriate Canadian Forces Base in one hour as well. Thus allowing 10 hours for the Base to prepare.

2. J3 ACV 2-2 developed a timeline model of the message path during Silent and Working Hours. He also developed streamlined procedures which would reduce the delays involved with normal processing. The Joint Staff Operational Research Team (JSORT) applied a Risk Analysis Tool to the J3 ACV model to estimate the probability of completing the processing in NDHQ in one hour in Silent and Working Hours. The following note documents the results of this Risk Analysis.

MESSAGE PROCESSING MODEL

3. The process begins with a transmission of the message from DFAIT to 763 Communications Centre (763 CC). The average time to complete this transmission is 15 minutes. 763 CC then passes the message to the National Defence Operations Centre (NDOC) which takes five minutes on average. During Silent Hours, NDOC would contact the J3 ACV Duty Officer which takes one minute on average and he would contact the J3 ACV Staff Officer at home. It would then take 30 minutes approximately for the J3 ACV Staff Officer to come in to NDHQ and prepare the message for the Base. During Working Hours, NDOC would contact the J3 ACV Staff Officer directly. It would then take 15 minutes on average to prepare the message for the base. Then 10 minutes to process the message through NDOC and five minutes to send the message at 763 CC. A streamlined procedure during Silent Hours would be for the J3 ACV Staff Officer to have the capability to send the message from his home thus saving the commute in to NDHQ and the processing in NDOC and 763 CC. A further streamlining would have 763 CC send the message to the Base directly when they receive the DFAIT message. This would by-pass most of the processing delays. Table I summarizes the timings of the message processing for these four cases.

TABLE I
MESSAGE PROCESSING MODELS

Activity	Silent Hours	Working Hours	Silent Streamed	Super Streamed
DFAIT	15 min	15 min	15 min	15 min
763 CC	5 min	5 min	5 min	5 min
NDOC	5 min	5 min	5 min	0
J3 ACV DO	1 min	0	1 min	0
J3 ACV	30 min	0	0	0
NDHQ	15 min	15 min	15 min	0
NDOC	10 min	10 min	0	0
763 CC	5 min	5 min	0	0
TOTAL	86 min	55 min	41 min	20 min
PROB < 60 min	12%	65%	82%	100%
PROB = 75%	100 min	69 min	53 min	27 min
PROB = 90%	120 min	88 min	71 min	40 min
PROB = 95%	133 min	101 min	84 min	51 min

RISK ANALYSIS

4. JSORT 2 entered these models into the @RISK Analysis Tool assuming the time estimates were exponentially distributed around the average shown in Table I. The only exception was the commute time which was considered a constant. The results are shown at the bottom of Table I.

5. The average time to process a message in Silent Hours is 86 minutes. Therefore things have to happen exceptionally well for the message to be processed in 60 minutes or less. The results suggest this would only occur 12 % of the time. However, 90% of the time the processing would take 120 minutes or less.

6. The average time to process a message during working hours is 55 minutes. The analysis suggests that 65% of the time the message would be processed in 60 minutes or less and 95% of the time the processing would be completed in 101 minutes or less.

7. The Streamlined Silent Hours Processing would take on average 41 minutes with 82% certainty of the processing taking less than 60 minutes.

8. The Super Streamlined Processing would take 20 minutes on average to process and would ensure 100% certainty that every message would be processed in 60 minutes or less.

CONCLUDING REMARKS

9. It is readily apparent that the Silent Hours Processing Plan will not result in messages being transmitted out of NDHQ in 60 minutes or less. Even during Working Hours, the confidence in the system processing the message in 60 minutes or less is probably not satisfactory. By streamlining the process, the confidence in the system can be improved. However, it is still not perfect. The Super Streamlined system appears to be the only option of the models considered that can guarantee 60 minute responsiveness.

REFERENCE

1. Risk Analysis and Simulation Add-In for Microsoft Excel or LOTUS 1-2-3
Palisade Corp; Newfield, N.Y.; USA: 1990-94

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With the new Chemical Weapons Inspection Protocol, a participating nation can request an on-site inspection of a facility in another country with only 12 hours notice. Therefore it is extremely important that the message traffic from the Department of Foreign Affairs and International Trade and the Department of National Defence be efficient enough to allow the Canadian Forces Base the maximum time to prepare. A Staff Officer in the J3 Arms Control Verification (J3 ACV) organization developed a timeline estimate of the message processing. The author, a member of the Joint Staff Operational Research Team, ran the @RISK analysis tool to determine the probability that a message will be processed by National Defence Headquarters and passed to the Base in one hour. Four potential processing paths were identified by J3 ACV. The normal processing path in Silent Hours was particularly risky. However, a Streamlined path appeared to provide a high reliability that the message would be processed in one hour.

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